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Clay flooring tiles — Specification

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Foreword

Rwanda Standards are prepared by Technical Committees and approved by Rwanda Standards Board (RSB) Board of Directors in accordance with the procedures of RSB, in compliance with Annex 3 of the WTO/TBT agreement on the preparation, adoption and application of standards.

The main task of technical committees is to prepare national standards. Final Draft Rwanda Standards adopted by Technical committees are ratified by members of RSB Board of Directors for publication and gazettment as Rwanda Standards.

DRS 511 was prepared by Technical Committee RSB/TC 9, *Civil engineering and building materials*.

In the preparation of this standard, reference was made to the following standard:

- 1) IS 1478: 1992 (Reaffirmed 2021), *Clay flooring tiles — Specification*
- 2) Philippines National Standard (PNS) 154:2005, *Ceramic wall and floor tiles – Specification*

The assistance derived from the above source is hereby acknowledged with thanks.

Committee membership

The following organizations were represented on the Technical Committee on *Civil engineering and building materials* (RSB/TC 9) in the preparation of this standard.

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Africeramics Ltd

Consultants Engineers Group (CEG) Ltd

D&D Resources Ltd

Dutureheza Ltd

Enabel Rwanda

Greenpack Africa Ltd

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Clay flooring tiles — Specification

1 Scope

This Draft Rwanda Standard specifies requirements, sampling and test methods for flooring tiles.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

DRS 546, *Clay products for building — Vocabulary*

RS ISO 10545-2, *Ceramic tiles — Part 2: Determination of dimensions and surface quality*

RS ISO 10545-3, *Ceramic tiles — Part 3: Determination of water absorption, apparent porosity, apparent relative density and bulk density*

RS ISO 10545-4, *Ceramic tiles — Part 4: Determination of modulus of rupture and breaking strength*

RS ISO 10545-5, *Ceramic tiles — Part 5: Determination of impact resistance by measurement of coefficient of restitution*

RS ISO 10545-7, *Ceramic tiles — Part 7: Determination of resistance to surface abrasion for glazed tiles*

RS ISO 10545-16, *Ceramic tiles — Part 16: Determination of small colour differences*

RS 107, *Building sand from natural sources — Specification*

3 Terms and definitions

For the purpose of this standard, the terms and definitions given in DRS 546 and the following apply.

4 Classification

The clay flooring tiles shall be of the three classes namely Class 1, Class 2 and Class 3.

5 Requirements

5.1 Raw materials

The clay flooring tiles shall be made from good raw materials of even texture and shall be uniformly well burnt. When sand is used, it shall meet requirements of RS 107.

NOTE Raw materials include clay, feldspar, sand/silica, kaoline and carbonates.

5.2 Manufacturing

The tiles shall be manufactured in a system that ensures consistency in quality. The system shall put in place measures to ensure the quality of raw materials, production and post-production management. The system shall be documented.

5.3 Workmanship

5.3.1 Clay flooring tiles shall be uniform in size and shape and shall be free from unslaked lime particles irregularities, such as twists, bends, cracks, flaws, laminations and imperfections which affect appearance or serviceability.

5.3.2 The faces of tiles shall be plain, grooved, fluted or figured as specified and the edges shall be square.

5.3.3 The backs of the tile may have some type of either plain or engraved or embossed design. The flooring tiles shall be weather-proof and corrosion-resistant and have adequate mechanical strength for covering floors.

5.3.4 The depth of the grooves or frogging on the underside of flooring tiles shall not exceed 3 mm.

5.4 Performance requirements

The clay flooring tiles shall comply with the performance requirements given in Table 1 when tested in accordance with the test methods specified therein.

Table 1 — Performance requirements for different classes of flooring tiles

| S/No.N | Characteristic | Requirements for | | | Test methods |
|--------|--|------------------|-----------|-----------|-----------------|
| | | Class 1 | Class 2 | Class 3 | |
| i) | Water absorption percent, max | 10 | 19 | 24 | RS ISO 10545-3 |
| ii) | Flexural strength, kg/cm width, Min: | | | | Annex B |
| | a) Average | 6 | 3.5 | 2.5 | |
| | b) Individual | 5 | 3 | 2 | |
| iii) | Impact, maximum height in mm of drop of steel ball | | | | RS ISO 10545-5 |
| | a) 15 mm thick | 25 | 20 | 15 | |
| | b) 20 mm | 60 | 50 | 40 | |
| | c) 25mm | 75 | 65 | 50 | |
| | d) 30 mm | 80 | 70 | 60 | |
| | Abrasion resistance (loss in volume), mm ³ , max. | 175 | 175 | 175 | RS ISO 10545-7 |
| | Chemical resistance | Resistant | resistant | Resistant | RS ISO 10545-16 |
| | Modulus of rupture , MPa | 4.0 | 3.0 | 2.5 | RS ISO 10545-4 |

6 Tolerances on dimensions and warpage

6.1 Dimensions

When measured in accordance with RS ISO 10545-2, the dimensions for clay flooring tiles shall be as declared by the manufacturer or as agreed between to the purchaser and the manufacturer, subject to the tolerance of ± 5 mm for length and width and ± 2 mm for thickness.

NOTE Nominal dimensions of the tiles are given in Annex A.

6.2 Warpage

6.2.1 When measured in accordance with 6.2.2, the warpage shall not exceed 0.7 % along the edges and 0.5 % along the diagonals.

6.2.2 Place a straight edge flat over the tile resting on a plane surface so as to leave maximum gap between the straight edge and the surface of the tile, as judged by the naked eye. Insert the measuring metallic wedge (see Fig. 1) in the gap and measure the maximum value of the gap.

7 Sampling

Sampling shall be performed in accordance with RS ISO 10545-1.

8 Marking

8.1 Each tile shall be legibly and indelibly marked with the registered name or trademark of the manufacturer.

8.2 In addition to the information in 8.1, and the following shall be legibly and indelibly marked on the bulk packaging:

a) the manufacturer, usage and class;

b) nominal dimensions;

c) address of the manufacturer;

d) country of manufacture; and

e) reference to this Standard.

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Annex A (informative)

Nominal dimensions of flooring tiles

The nominal dimensions for clay flooring tiles are given in Table A.1 and A.2. The tiles in Table A.1 are for areas where no vehicles are permitted such as sidewalks, etc. Tiles in Table A.2 can be used in areas where vehicles are permitted.

Table A.1 — Nominal dimensions of floor tiles for sidewalks and other light applications

Unit: mm

| Width x Length | Thickness, min. |
|----------------|-----------------|
| 75 x 100 | 5 |
| 100 x 100 | 5 |
| 108 x 108 | 5 |
| 150 x 150 | 6 |
| 100 x 200 | 6 |
| 150 x 200 | 6 |
| 200 x 200 | 6 |
| 250 x 250 | 7 |
| 200 x 300 | 7 |
| 300 x 300 | 7 |
| 400 x 400 | 8 |
| 450 x 450 | 8 |
| 500 x 500 | 9 |

Table A.2 — Dimensions for sides and thickness of tiles for areas where vehicles are permitted

| Sl No. | Size mm | Thickness, <i>Min</i> mm |
|-----------|------------|-----------------------------|
| i) | 150 × 150* | 15 |
| ii) | 150 × 150* | 20 |
| iii) | 200 × 200 | 20 |
| iv) | 200 × 200 | 25 |
| v) | 250 × 250* | 30 |

Annex B (normative)

Determination of flexural strength

B.1 Test specimens

Six tiles shall be used for this test from the sample selected in the manner described in 7.

B.2 Apparatus

B.2.1 The apparatus (see Fig. 2) shall consist of two parallel self-aligning cylindrical steel bearers, with the bearing surface rounded to 40 mm diameter, and so placed that the distance between the centres can be altered. The load shall be applied through a third steel bearer of similar shape placed midway between and parallel to the supports. The length of all the bearers shall exceed the maximum width of the tile under test for square and rectangular tiles.

B.2.1 The loading device may consist of a bucket connected either directly or through levers to the loading arms. The loading shall be at a uniform rate of 450 to 550 N/min by allowing lead shots to flow into the bucket. Provision shall be made to arrest the flow of lead shots immediately as the tile breaks.

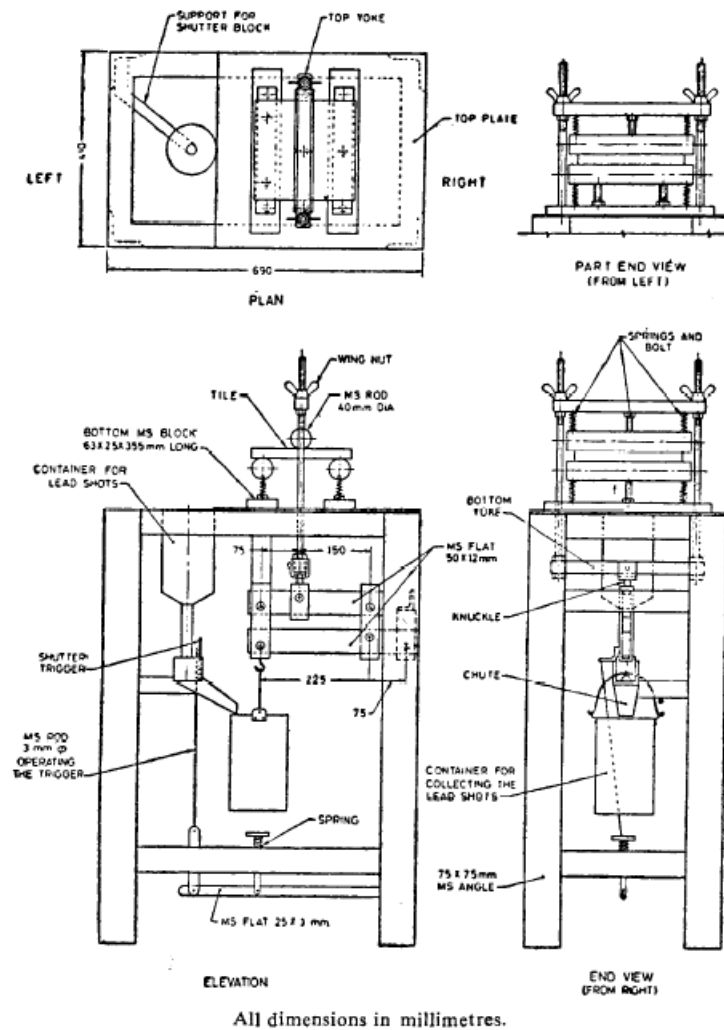


FIG. 2 TILE TESTING MACHINE FOR DETERMINATION OF FLEXURAL STRENGTH

B.2.2 Alternatively, a compression testing machine with a minimum load frame capacity of 10 tons may be used (see Fig. 3), In this system the bearer assembly is mounted on a rigid mild steel plate and the third central loading bearing is fixed through a suitable dial micrometre (least count 0.25 mm) or an equally sensitive device to bear on the loading member or on the specimen at mid span. The specimen is supported on the bottom parallel bearers separated by a distance of minimum three-fourths ($\frac{3}{4}$) of the length of the tile.

B.2.2.1 The error in the load reading shall not exceed 2.2 N for loads up to 220 N and for greater load, the error shall not exceed 1 percent of the maximum load. The rate of loadings should be uniform and vary in the range of 450-550 N/min.

B.3 Procedure

B.3.1 Test three tiles in the dry condition, that is, after drying in an oven at 100°C to 110 °C till constant weight is attained and the other three tiles after soaking in water at 24 °C to 30 °C for 24 h. Support the tile evenly flatwise on the bearers set with a span equal to three-fourths the dimensions of the tile and resting on tile natural bottom surface. To ensure uniform distribution of load at supports, provide suitable packing between the tile and

the bearers. Apply the load with the direction of the load perpendicular to the span at a uniform rate of 450 to 550 N/min

B.4 Calculation and report test results

B.4.1 The individual breaking load shall be recorded and the flexural strength shall be obtained width by dividing the breaking load by the width of the tile and the average of the six values calculated.

B.4.2 The result shall be expressed in N/mm width.

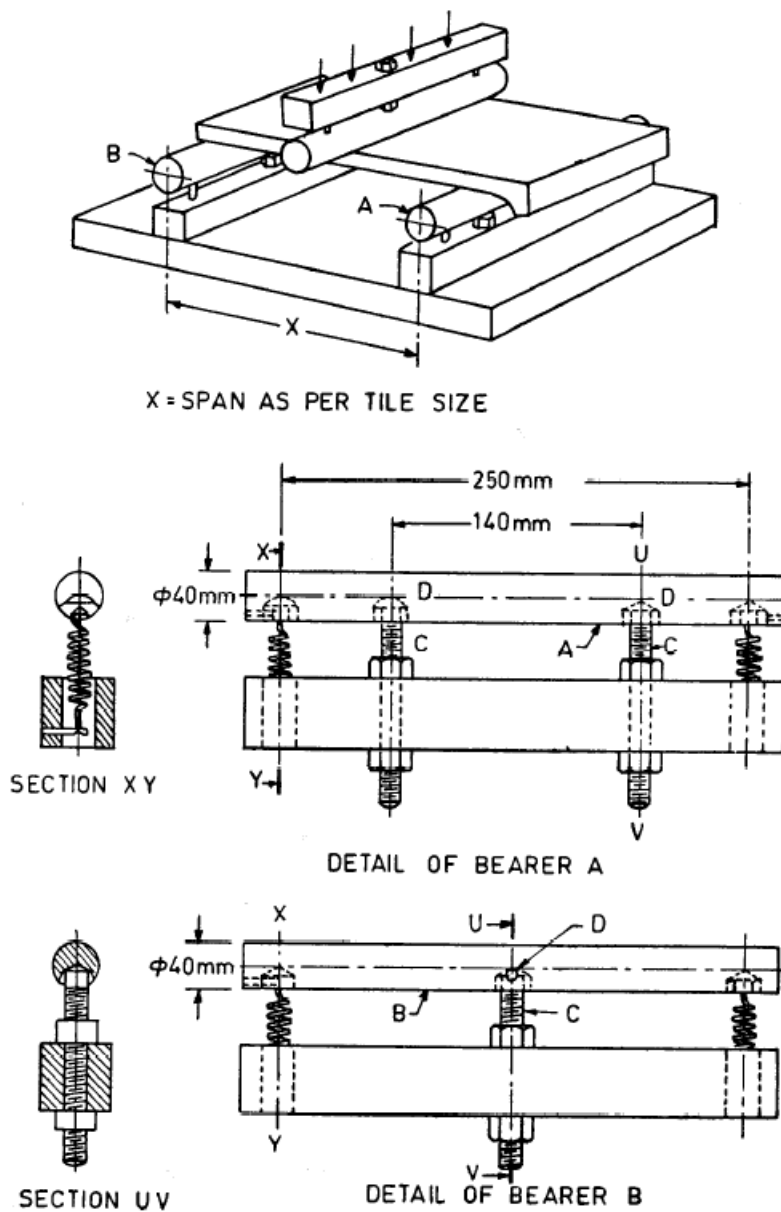


FIG 3 ESSENTIAL OF APPARATUS FOR TRANSVERSE TEST

B.4.3 Steel rule, graduated in increments of 1 mm.

B.4.4 Steel straight-edge, of length at least 450 mm.

B.4.5 Four steel measuring wedges, graduated in increments (indicating increments of thickness) of 1 mm, and each of length 60 mm, of width 10 mm and of a thickness that tapers uniformly from 10 mm at one end to zero at the other end.

C.1.4 Flat surface of steel or glass, of size at least 450 mm x 450 mm, and plane to within 0.15 mm.

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Bibliography

- [1] RS 310: 2022, *Burnt clay paving units — Specification*

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